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Normal Anatomical Variants of Cerebral Dural Venous Sinuses in Mr Venography in the General Population in North Costal Andhra Pradesh

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ABSTRACT

AIMS & OBJECTIVES

1. To determine the normal anatomic variants of Dural venous sinuses.
2. Incidence and Prevalence of these variants in general population with respect to gender and age.
3. To avoid overdiagnosis of CSVT.

MATERIALS & METHODS

- MRV data of **90** patients during study period was retrospectively reviewed for 1year,scans were performed in 1.5telsa MR machine.
- **Inclusion Criteria:** Patients with more than 18 years of age were included in this study.
- **Exclusion Criteria:** Patients with any congenital or acquired intracranial abnormality / venous thrombosis or previous surgery were excluded from the study.

RESULTS

Our study included a total of 90 patients (36 men, 54 women), aged between 18 to 61 years.So out of 90 members, 40 scans were absolutely normal and symmetrical. Left transverse sinus was hypoplastic in 23 and aplastic in 10 cases. Right transverse sinus was hypoplastic in 11 and aplastic in 1case. 1 case had bilateral hypoplastic transverse sinuses, 1 case showed hypoplastic right transverse and sigmoid sinus and 1 case showed hypoplastic left transverse and sigmoid sinus.

CONCLUSION

In the absence of this, flow gap in the venous sinus, hypoplasia and aplasia of the transverse sinus may be mistaken for venous sinus thrombosis.

Most common anatomical variation is hypoplastic left transverse sinus. Other sinuses are normal in most of the the patients and showed very few variations.

Importance of male predominance of hypoplastic transverse sinus is not clear. Other anatomical variations of dural venous sinuses are not signficantly differ among both genders.

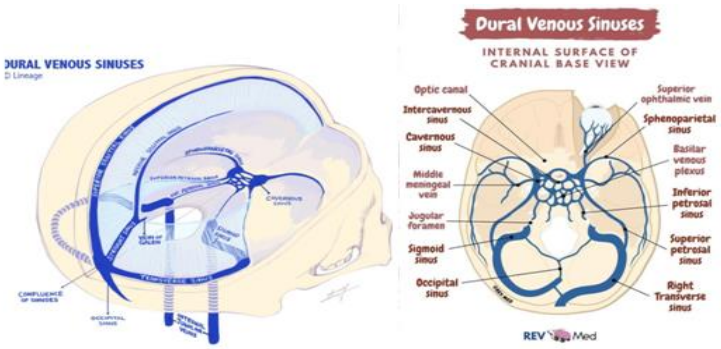
INTRODUCTION

Normal Venous Anatomy

The venous system of the brain consists of two major components, the dural venous system and the cerebral venous system.

Dural Venous Sinuses

- Dural venous sinus can be further subdivided into superior and inferior groups.
- The superior group is the more prominent group and lies relatively posterior, which consists of the superior sagittal sinus(SSS),inferior sagittal sinus(ISS), Sinus confluence (torcular herophili), Straight sinus (SS), Transverse sinuses(TSs),Sigmoid sinuses and Jugular bulbs.
- Whereas the inferior group lies relatively anterior and consists of the cavernous sinus (CS) and it's tributaries like Superior and inferior petrosal sinuses (SPSs,IPSs), and sphenoparietal sinus (SphPS).



Superior Sagittal Sinus (SSS):

- The superior sagittal sinus is a curvilinear sinus that runs parallel to the inner calvarium.
- Increases in diameter of the SSS can be result of increase in diameters of any of the following

Tributaries

- As it courses posteriorly most of the unnamed small superficial cortical veins and the larger anastomotic vein of Troland drains into superior sagittal sinus.
- Emissary and bridging veins connect the extracalvarial scalp veins with the SSS.
- Venous lakes in the diploic spaces of the calvaria drain into the SSS.

Normal Variants

- There are two most common variations of SSS.
- First being atresia of anterior one third SSS. And the second being hypoplasia. Descending order of hypoplasia is middle part, anterior one third, anterior 2/3rd and anterior half of SSS.

Inferior Sagittal Sinus (ISS)

- Another curvilinear, yet smaller venous channel, that lies inferior to the SSS, lies in the bottom of the falx cerebri. It lies above the Corpus callosum and Cingulate gyrus.

Tributaries

- Along it's course, it collects all the small tributaries along the inferior free margin of the falx. Finally it terminates after joining with the great cerebral vein of Galen(VofG) at the falx tentorium and forms the Straight sinus(SS)[1]

Normal Variants

- Hypoplasia or small ISS is the most common variant however it is seen inconsistently on imaging studies.

Straight Sinus (ss)

- The straight sinus is formed by the junction of the ISS and VofG and runs posteroinferiorly up to apex.

Normal Variants

- Variants in straight sinus are relatively uncommon.
- The persistent falcine sinus will connect the ISS or VofG directly with the SSS, which is seen in 2% of individuals [4].

Transverse Sinuses(TS)

- The TSs also known as lateral sinuses, curve laterally from the torcula to the petrous temporal bone, and turn inferiorly and become the sigmoid sinuses.

Normal Variants:-

- Asymmetry of transverse sinuses is the most common variant.

- Hypoplastic left transverse sinus being the commonest, affecting 1/3rd of the general population. Arachnoid granulations giving pseudothrombosis appearance is 2nd most common entity.

Sigmoid Sinuses

Normal Variants

- Hypoplasia of either Right/Left sigmoid sinuses or both. Sometimes atresia can also be seen.

Superior and Inferior Petrosal Sinuses

- The SPS extends from the CS to the sigmoid sinus and courses posterolaterally along the petrous temporal bone.
- The Inferior Petrosal sinuses joins with the sigmoid sinus and forms the Internal Jugular Veins.

Sphenoparietal Sinus

- The Sphenoparietal sinus courses traverses in the middle cranial fossa along the lesser sphenoid wing.

Tributaries

- Superficial veins from the anterior temporal lobe drains into Sphenoparietal sinus, which in turn drains into the Cavernous sinus.

AIMS & OBJECTIVES

1) To determine the normal anatomic variants of Dural venous sinuses.
2) Incidence and Prevalence of these variants in general population with respect to gender and age.
3) To avoid overdiagnosis of CSVT.

MATERIALS & METHODS

- A retrospective study was conducted in our Radiodiagnosis department for a duration of 1 year to study the normal anatomy and it's variations of the intracranial venous system, using 3D MR venography, in normal adults and any gender-related differences.
- Patients who presented with headache, were sent to MRI for further evaluation after ruling out other causes, in NRIIMS department of radio diagnosis, VISAKHAPATNAM from January 2021 to January 2022 were enrolled in this study.
- MRV data of **90** patients during study period was retrospectively reviewed.
- **Inclusion Criteria:** Patients with more than 18 years of age were included in this study.
- **Exclusion Criteria:** Patients with any congenital or acquired intracranial abnormality / venous thrombosis or previous surgery were excluded from the study.

MR imaging was performed with 1.5-TMR machine with standard head coil. Three dimensional MR venography was performed in the coronal plane.

Image Analysis

- Maximum intensity projections (MIPs) were created and viewed in all three planes, i.e. sagittal, transverse and coronal planes, and all the dural venous sinuses from superior sagittal sinus, sigmoid sinus, transverse sinus, straight sinus and occipital sinus were included. The internal jugular veins were not included in the study.
- Anatomical variations of transverse and sigmoid sinuses were noted which included symmetry, hypoplasia and aplasia or atresia.

Region of Interest

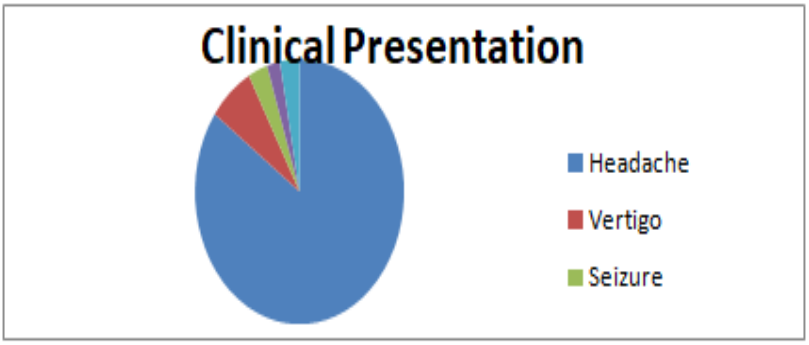
- Transverse sinuses - 1 cm from the confluence.
- Sigmoid sinuses - 1 cm from the transverse sigmoid junctions.
- Their linear measurements were compared with the superior sagittal sinus.

Criteria for Considering Hypoplasia & Aplasia

- **Hypoplasia**: If the linear measurement is less than half the size of the superior sagittal sinus(SSS)
- **Aplasia:** If the sinus is not visualised completely it was considered aplastic sinus.

OBSERVATIONS AND RESULTS

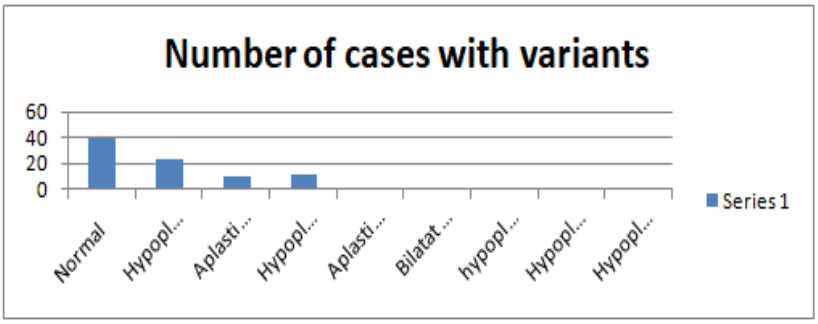
- Our study included a total of 90 patients (36 men, 54 women), aged between 18 to 61 years.
- Most common presentation was headache (85%) and others included vertigo (7%), Seizure (3%), vomiting (2%), altered sensorium(3%). For various reasons, for study purpose MRV was done.



Results Obtained Were as Follows

So out of 90 members, 40 scans were absolutely normal and symmetrical. Left transverse sinus was hypoplastic in 23 and aplastic in 10 cases. Right transverse sinus was hypoplastic in 11 and aplastic in

1case. 1 case had bilateral hypoplastic transverse sinuses, 1 case showed hypoplastic right transverse and sigmoid sinus and 1 case showed hypoplastic left transverse and sigmoid sinus.



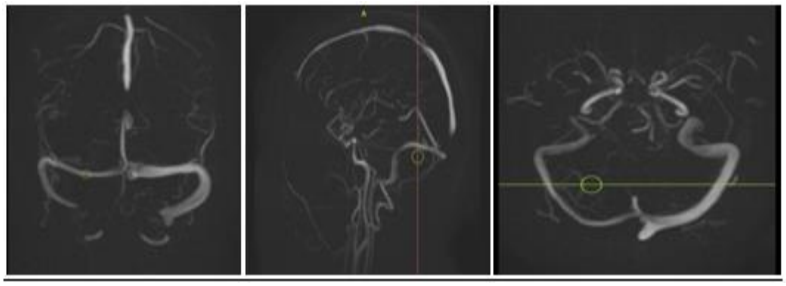
INFERENCE

- On comparison, symmetrical transverse sinus are more common in females than male population .
- Left transverse sinus was hypoplastic more commonly in male than female (13 versus 10).
- 95% of the population had a normal Superior Sagittal Sinus.
- Most common variation of SSS was hypoplastic anterior one third SSS (2 members).
- Other variations were aplastic of anterior one third of SSS , hypoplasia of the middle part of SSS, hypoplasia of anterior 2/3rd of SSS and
- hypoplasia of anterior half of SSS which are not seen in present study.

Images

This is a case of 35 year old male patient c/o headache with **hypoplastic left transverse sinus.**

This is a case of 46 year old male patient came with c/o altered sensorium, diagnosed with meningitis, showed **hypoplastic right transverse and sigmoid sinus.**



DISCUSSION

- Goals of this study is to evaluate the anatomical variants in Dural Venous Sinuses in the brain. Most common indication to get MRV of the brain was headache in this study. Hypoplastic left transverse sinus was the most common anatomical variation, which has slight male preponderance compared to female. While other anatomical variations of transverse and sigmoid sinuses are not effected by the gender. Hypoplasia of anterior one third of SSS was the most common variation of SSS.

From a Study by Gourav Goyal et al

- Transverse sinus abnormalities were described by Gourav goyal et al. Of the 1654 MR venograms obtained, the transverse sinus was found to be symmetrical in 1106 (66.9%) patients. Left transverse sinus was hypoplastic in 352 (21.3%) and aplastic in 67 (4.1%) cases. Right transverse sinus was hypoplastic in 91 (5.5%) and aplastic/atrectic in 12 (0.7%) patients. 1.6% cases had bilateral hypoplastic transverse sinuses[2].

From a Study by Alper et al

- Transverse sinus abnormalities were described by Alper et al . Symmetrical transverse sinuses were reported in 31%. Left transverse sinus was hypoplastic in 39% and aplastic in 20% of cases. Right transverse sinus was hypoplastic in 6% and aplastic in 4%. In other study of 100 patients, 10% had symmetrical transverse sinuses, 35% hypoplastic left transverse sinus, 13% hypoplastic right transverse sinus and 1% had aplastic left transverse sinus[5].

From a study of Kaplan and Browder

- Kaplan and Browder reported hypoplastic rostral SSS in 7 of 382 (1.8%) anatomic specimens in 1 series and in 12 of 201 (6%) specimens in a second anatomic series Occipital sinuses were reported from 4 to 35.5% of cases in different studies.In a study of 100 children, persistent occipital sinuses were seen in 13% of patients less than 25 months of age but in only 2% of children older than 5 years . In a study of 100 children, persistent occipital sinuses were seen in 13% of patients less than 25 months of age but in only 2% of children older than 5 years[3].
- In contrast, our study showed symmetrical transverse sinus in 44.4 %, hypoplastic left transverse sinus in 26% and hypoplastic right transverse sinus in 12.2 %.
- In our study, occipital sinus was identified in 3 % of the patients. Over reported incidence of the occipital sinus in the literature may be attributed to wrong interpretation of other venous structures as occipital sinus or ethnical differences of studied populations. Accurate information of the incidence of occipital sinuses can be accumulated by future autopsy series.

RESULTS

- Our study included a total of 90 patients (36 men, 54 women), aged between 18 to 61 years.So out of 90 members, 40 scans were absolutely normal and symmetrical. Left transverse sinus was hypoplastic in 23 and aplastic in 10 cases. Right transverse sinus was hypoplastic in 11 and aplastic in 1case. 1 case had bilateral hypoplastic transverse sinuses, 1 case showed hypoplastic right transverse and sigmoid sinus and 1 case showed hypoplastic left transverse and sigmoid sinus.

CONCLUSION

- To conclude, we have to know all the anatomical variations in the MR venography to correctly diagnose CVST.
- In the absence of this, flow gap in the venous sinus, hypoplasia and aplasia of the transverse sinus may be mistaken for venous sinus thrombosis.
- Most common anatomical variation is hypoplastic left transverse sinus. Other sinuses are normal in most of the the patients and showed very few variations.
- Importance of male predominance of hypoplastic transverse sinus is not clear. Other anatomical

variations of dural venous sinuses are not signficantly differ among both genders.

REFERENCES

1. Cheng Y et al: Normal anatomy and variations in the conuence of sinuses using digital subtraction angiography. Neurol Res. 39(6):509-515, 2017
2. Gourav goyal et alAnatomical Variations of Cerebral MR Venography: Is Gender Matter?Neurointerventions 2016 Sep; 11(2): 92–98. 12. Alper F, Kantarci M, Dane S, Gumustekin K, Onbas O, Durur I. Importance of anatomical asymmetries of transverse sinuses: an MR venographic study.
3. Kaplan HA, Browder AA, Browder J. Atresia of the rostral superior sagittal sinus: associated cerebral venous patterns. Neuroradiology. 1972;4:208–211
4. Kuijf HJ et al: Quantication of deep medullary veins at 7 T brain MRI. Eur Radiol. 26(10):3412-8, 2016
5. Alpher etal: Importance of Anatomical Asymmetries of Transverse sinuses. Cerebrovasc Dis 2004;18:236-239